Review

植物研究雑誌
J. Jpn. Bot.
69: 185–203 (1994)

The Use of the New World Araceae as Drug Plants

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(Received on March 12, 1994)

The Araceae have been used both internally and externally for medicinal purposes. External use has largely involved plant parts or extracts in poultices applied directly to the affected areas to cauterize, to disinfect, to stop bleeding or to act as a rubefacient. In all, 61 species of Araceae have been used externally for a broad range of medicinal purposes by populations in both North and South America. Principal uses have been as a remedy for sores, infections, aches, poisonous bites, or as an insecticide or vermifuge. Many fewer species, a total of 33, have been used internally for an even broader array of medicinal purposes, including problems of the respiratory system, aches, infections, poisonous bites, sexual diseases, as well as for contraceptives, as purgatives and as hallucinogens.

Introduction

The Araceae is a family of 105 genera and roughly 3,200 species (Croat 1993) that is concentrated primarily in tropical areas of the world. There are two major centers of species diversity, tropical Asia and tropical America, with a nearly equal number of genera, 34 for Asia and 36 for America (Croat 1979). While the paleotropics has more genera (67 versus 36), the neotropics has roughly two-thirds of all the species of the world's Araceae. The family remains one of the most poorly known taxonomically with a large proportion of its species in all areas, but especially in South America, still unidentified. Certainly in some areas, especially in those along the Pacific slope of northwestern South America, large percentages of the total remain undescribed. The family inhabits a wide spectrum of ecological zones (Croat 1988 [1990]) from semi-desert to montane rain forests and is widely diverse in habit, ranging from free-floating aquatics (*Pistia*), to wholly submerged aquatics (*Jasarum*), free-standing aquatics (*Montrichardia, Urospatha*), terrestrial understory herbs (*Chlorospatha, Dieffenbachia, Homalomena, Spathiphyllum, Xanthosoma*), appressed-climbing hemiepiphytes (*Anthurium, Monstera, Philodendron, Raphidophora, Syngonium*), true epiphytes (*Anthurium, Philodendron, Stenospermation*), or with subterranean tubers (*Asterostigma, Caladium, Dracontium, Gorgonidium, Taccarum, Spathanthium, Synandrospadix*).

The family was divided by Engler (1905–1920) into nine subfamilies. Major changes have been made in what constitutes these subfamilies by modern revisionists. Bogner and Nicolson (1991) retain much of the Englerian system and still divide the family into nine subfamilies but make major changes at the tribal level. Hotta (1970), working with only the Asian members of the family, suggested some major changes. Grayum (1984, 1990), while incorporating some of Hotta's ideas, went much further in revising Engler's suprageneric system of classification. Grayum divided the family into seven subfamilies and made radical changes at both the subfamilial and tribal levels. A comparative review of the differences in all these systems is made by Croat (1990).

The family is replete with ornamental plants, being, at least in North America, the most important family for indoor ornamental plants. More than one-half of the top dozen sales records for all foliage plants sold in North America are typically Araceae. Some of the genera of the Old World are commonly cultivated in the New World as ornamental plants (*Aglaonema, Alocasia*) or as food stuffs (*Alocasia, Colocasia*). It is not uncommon to see at least those used for foodstuffs occurring as escaped or abandoned plants. In Asia a number of New World genera are also common in some areas. Common ornamentals include *Caladium, Dieffenbachia, Monstera* and *Syngonium.*

Medicinal Uses of the Araceae

This paper will constitute a review of earlier literature dealing with New World aroid species deemed to be useful as medicinal plants. Because of constraints on space no treatment will be included here for a number of introduced Asian species which have medicinal value. Especially important among the works reviewed are those of the late Timothy Plowman, "Folk Uses of New World Araceae" published in 1969 and of Schultes and Raffauf, "The Healing Forest", a book published in 1990. Also important are those references made by Julia Morton in her major work entitled "Atlas of Medicinal Plants of Middle America". This was published in 1981 after many years of investigations. Finally, an important source of information, as yet unpublished, is the data on Araceae accumulated by Walter H. Lewis and his wife Memory Elvin Lewis during their studies among the Indians of the upper Amazon basin, especially in Peru. The Lewises have kindly consented to let me use this information and any reference in the paper followed by citations of Lewis et al. collections is directly attributable to their work.

One of the problems with all of the works by earlier ethnobotanists is that the authors were not specialists in the Araceae and much of the anthropological work, as well as that information gleaned from other sources and from herbarium specimens was done at a time of abysmal ignorance regarding the taxonomy of the family. Where it is possible to determine which species is cited, this paper will make taxonomic corrections.

Plowman (1969) included in his "folk uses" many non-medicinal uses of plants including use in construction, for rituals, and as ornamentals, but this paper will be restricted to medicinal uses or other uses that might give some evidence of medicinally active ingredients in the plants, such as in cases where the plants are used as fish poisons or where they are consumed for hallucinogenic purposes.

Though the family is still poorly known chemically, Schultes and Raffauf (1990) report that alkaloids including codeine, 5-hydroxytryptamine, liriodenine and berberine derivatives are present in the family as well as saponins, polyphenols and cyanogenic compounds. Irritating substances, such as calcium oxalate crystals in *Dieffenbachia* are common in the family. Specialized needle-like structures called trichosclerieds, common to the subfamily Monsteroideae, may cause serious mechanical damage when eaten. Several different species reputedly contain oxytocic substances which may cause uterine contractions, making them effective for menstrual difficulties. The oxytocic substances may actually increase uterine contractions to cause premenstrual/menstrual pains (Kahl pers. comm.), or to give assistance in childbirth or for use in inducing abortion.

Relatively few of the aroids are clinically proven medicinal plants and most of the information that has accumulated is of an anecdotal nature. Still, it is clear that, at least in the mind of native peoples, the family constitutes an important one because it is used in the medicinal and ritual life of the New World Indian populations. Much of the credit for the extraction of this information is owing to the lifelong interest of Dr. Richard Evans Schultes of the Economic Herbarium of Harvard University and this paper is dedicated to him.

Since the medicinal information associated with Araceae is involved with such a wide spectrum of maladies and since most of the previous information regarding medicinal uses was presented in a straightforward alphabetical sequence, the same procedure will be followed here. Collection vouchers cited are chiefly those reported by Schultes and Raffauf or Walter H. Lewis and Memory Elvin Lewis. Those of the former are deposited at ECON, whereas those of the latter are deposited both at MO and USM. A few unidentified species which have not yet been investigated are reported by both Schultes and Raffauf and also by Lewis et al. The vouchers for these collections have not been located. In a family as complex as the Araceae the reporting of herbarium vouchers is quite essential to protect the validity of the information recorded. Some of the species cited in the paper by Schultes and Raffauf were reported earlier under other names.

Acorus calamus L., long used and often discussed as a medicinal plant, is not included here since it is widely perceived as no longer being a member of the Araceae (Grayum 1990).

Alphabetical Listing of New World Araceae with Drug Uses

Anthurium sp.

The stem is scraped and the juice is applied for treating ringworm by the Mayna Jívaro of Peru (Lewis et al. 10439).

Anthurium sp.

The caustic sap of this species is applied directly to the skin by the Ingano Indians in the vicinity of Macoa (Putomayo Province of Colombia) to control fever sores (Schultes and Raffauf 1990). Schultes & Smith 2064.

Anthurium sp.

The stem and mature spikes of this species are chewed as a remedy for toothaches by the Kamsá Indians in the upper Río Putomayo near the Ecuadorian border of Colombia (Schultes and Raffauf 1990). Schultes 3238a.

Anthurium sp.

Schultes and Raffauf (1990) reports that this species is used ritually in "curing" but without any known purpose. Schultes & Cabrera 16524.

Anthurium sp.

Known in Quichua as 'Chontarucu-paju' or as 'Ninuno' in Spanish, this species is used to combat the herpes virus. The plant is ground and the resulting material is applied very hot to the affected areas. The curing time is purportedly slow. Alacón & Balslev 47.

Anthurium sp.

The Chocó Indians of Panama use a decoction of the species to treat whooping cough (Duke 1968).

Anthurium amoenum Kunth, Pflanzenr. 23. IV.B. 110 (1905).

This species was erroneously reported by Gines et al (1953) as *Anthurium oblongo-cordatum* Engler. A decoction of the plant is used by the Kunana Indians of northern Venezuela as an antidote apparently for poisoning. The species is native to northeastern Venezuela.

Anthurium apaporanum R. E. Schultes, Bot. Mus. Leafl. Harvard Univ. **18**: 115. pl. 19 (1958).

Erroneously reported as *A. aureum* Engler by Schultes and Raffauf (1990), the species ranges from southern Venezuela and Colombia (Vaupés) to Ecuador and Peru. In the region of the upper Río Putomayo in the vicinity of Puerto Ospina, the plant is an effective remedy when used as a poultice for wounds inflicted by sting rays. Schultes & Cabrera 18958, 18959.

Anthurium breviscapum Poeppig, Nov. Gen. and Sp. **3**: 84 (1845).

The species ranges from southern Colombia and Venezuela to Ecuador and Peru. The spadix of this species is split, scraped, and the juice is applied to the skin to remove maggots by the Achuar and Mayna Jívaro of Peru (Lewis et al. 10977).

Anthurium crassinervium (Jacq.) Schott, var. *caatingae* R. E. Schultes, Bot. Mus. Leafl., Harvard Univ. **26**: 179 (1978).

This species was described from the Mitú region in southern Colombia. It probably is synonymous with *Anthurium bonplandii* Bunting var. *cuatrecasii* Croat which ranges from southern Colombia NE to the drainage of the middle and upper Río Orinoco (Croat 1990). If so, the varietal epithet is an older one (albeit described in the wrong species) and will have to be repositioned. Schultes and Raffauf (1990) report that a decoction made from the leaves of this species are used by the Kubeo Indians of the Mitú region of Meta Department of Colombia as an earwash for what is probably a fungal infection of the ears. Schultes et al. 24202.

Anthurium eminens Schott, Oester. Bot. Wochenbl. **5**: 273 (1855).

This species ranges mostly through the Amazon basin from southern Colombia to Bolivia east to the Guianas and Brazil but also with outlying populations in the Magdalena River Valley of central Colombia. The Achuar Jívaro of Peru use the juice scraped from the stem or leaves for maggot infestations of the skin and for treating tapeworms in dogs (Lewis et al. 11139). It is used by the Mayna Jívaro for treating skin diseases of the scalp (Lewis et al. 10505). Juice from split and scraped spadices is applied to leishmaniasis, especially in the nostrils (Lewis et al. 10926). Schultes and Raffauf (1990) report this species as being used as an unspecified medicinal for animals (based on herbarium vouchers of Pinkley 288, 471a, 471b). The Waorani Indians of NE Ecuador use a decoction of crushed leaves of this species applied to botfly infections to kill the organism making it easier to remove (Schultes and Raffauf, 1990). Davis & Yost 962.

Anthurium ernestii Engler, Pflanzenr. IV. **24B** (Heft 21): 73 (1905).

Schultes and Raffauf (1990) report this western Amazonian species (under the name *A. tenuispadix* Engl.) to be used as a medicinal gargle in the treatment of sore throats. The Quichua Indians of Ecuadorian Amazonia in the vicinity of Nuevo Rocafuerte use this species as a cure for the herpes virus. The plant is ground, heated and applied to the affected area. The curing process is said to be slow. Pinkley 245.

Anthurium ernestii Engler ssp. *olgaardii*, Ann. Missouri Bot. Gard. **78**: 646–647 (1991).

The species is endemic to the northern Amazon basin in east central Ecuador in Pastaza Province and in adjacent Peru. Mestizos of the region apply scraped inflorescences of the species to treat larval infestations (Lewis et al. 11560).

Anthurium flexuosum Kunth, Enum. Pl. **3**: 82 (1841).

Schultes and Raffauf (1990) report that the sap of this aroid is used on blind people to help them recover their sight! It is also taken by the spoonful when fasting to deal with problems of the spleen. The determination of the species is doubtful. LaRotta 73.

Anthurium gracile (Rudge) Schott, Wiener Z. Kunst **3**: 828 (1829).

The species ranges from Guatemala to the West Indies, the Guianas, Brazil, and Peru. The Mayna Jívaro of Peru use crushed roots of the species to apply to snake bites (Lewis et al. 10473). The Achuar Jívaro use the root juice as a poultice (Lewis et al. 12866) and also drink the juice for snake bites (Lewis et al. 12708). Schultes and Raffauf (1990) reported this species (as *A. scolopendrinum* (Ham.) Kunth) to be an effective mouthwash for toothaches among the Kofán Indians of SW Colombia and NE Ecuador.

Anthurium infectorum R. E. Schultes, Bot. Mus. Leafl., Harvard Univ. **20**: 336 (1964).

Reported by Schultes and Raffauf (1990) to be used by the Kubeo Indians of SE Colombia along the Río Kuduyarí for painting teeth to prevent tooth decay. This species is known only from the type locality. It is similar to *A. atropurpureum* Schultes and Maguire and may prove to be inseparable from that species. Schultes & Cabrera 19674.

Anthurium loretense Croat, Ann. Missouri Bot. Gard. **78**: 675–677 (1991).

The species is known from western Brazil, northern Peru and southern Ecuador. The crushed roots of this species is used as a poultice for snakebite by the Achuar, Mayna and Huambisa Jívaro in Peru (Lewis et al. 12841, 10699). The Huambisa also imbibe the same substance for snakebite (Lewis et al. 12477).

Anthurium oxycarpum Poeppig, Nov. Gen. Sp. **3**: 83 (1845).

The species ranges from SE Colombia to Amazonian Ecuador, Peru, Bolivia, and Brazil. It was reported by Peckolt (1892) as a possible aphrodisiac by Indians of South America. There is no way that the species can be confirmed, but the species is a distinct one and has never been confused with any other. The dried and pulverized leaves of this species are used to form a hallucinogenic concoction by the Yumbo Indians of Ecuador (Schultes and Raffauf, 1990). A similar use is attributed to the Quichua Indians of the Ecuadorian Amazonia in the vicinity of Jatuncocha (Alarcón 1988). Baslev 2936.

Anthurium palmatum (L.) Schott, Wiener Z. Kunst **3**: 828 (1829).

The species is native to the Lesser Antilles (St. Lucia to Guadeloupe). The Carib Indians of the Lesser Antilles used fresh material of this plant along with the scrapings of conch shells as a cure for yaws (Hodge 1942, 1954; Hodge and Taylor 1957).

Anthurium scandens (Aubl.) Engler, Mart. Fl. Bras. **3**(2): 78 (1878).

The species ranges from southern Mexico and West Indies to southern Brazil. Mesa (1941) reports that a medicinal tincture is prepared from the fresh roots. Schultes and Raffauf (1990) report that a decoction of the leaves is considered a good treatment for snakebite among the Tikuna Indians located in the Trapezco Amazonica north of Leticia. The bite is bathed with the liquid and a small amount of the liquid is consumed internally.

Anthurium schlechtendalii Kunth, Enum. Pl. **3**: 75 (1841).

Ranging from the central Veracruz State of Mexico to Nicaragua, this is probably the species reported as *A. crassinervium* (Jacq.) Schott by Schultes (1941) for northeastern Oaxaca. He reported that the crushed leaves and stems are applied to warts to stop their growth. The former species occurs only in northern Venezuela and northeastern Colombia.

Anthurium tikunorum R. E. Schultes, Bot. Mus. Leafl., Harvard Univ. **16**: 63 (1953).

The juice from the fruits of this narrowly endemic species provides an astringent used to control the flow of pus from a pyorrhea-like disease of the gums common among the Tikuna Indians of the Leticia region of Colombia (Schultes and Raffauf 1990). Schultes 8108.

Anthurium uleanum Engler, Pflanzenr. IV. **23B** (Heft 21): 74 (1905).

The species ranges from southern Colombia to western Brazil and Peru. The Mayna Jívaro scrape split spadices and apply the pulp to dogs' skins to treat tapeworm (Lewis et al. 11044) or use crushed roots for snakebite (Lewis et al. 10399). They use cut stems for direct application to skin for relief of rheumatic areas (Lewis et al. 10216A). The ground and boiled roots of this species are used in a decoction which is drunk as a remedy for headaches by the Secoya Indians (Schultes and Raffauf, 1990) (based on Vickers 220). The Kofán Indians of Amazonian Ecuador crush all parts of the species in hot water and use the solution externally for relieving pain in stiff neck muscles (Schultes and Raffauf loc. cit). Pinkley 290.

Anthurium uleanum Engler var. *nanayense* Croat, Ann. Missouri Bot. Gard. **78**: 742–743 (1991).

The variety is endemic to Loreto Department of Peru. The crushed roots are used as a poultice for snakebite (Lewis et al. 10699).

Anthurium vaupesiana Croat, Ann. Missouri Bot. Gard. **78**(3): 746 (1981).

Endemic to southern Colombia, Plowman (1969) reports that the dried and pulverized spadix of *A. tessmanii* is used as a contraceptive by the Makuna Indians of SE Colombia. The same usage is reported by Schultes (1963) among the Barasana (later reported by Schultes and Raffauf (1990) as the Makuna Indians) and Taiwano tribes of Colombia. At least the collections reported by Schultes were actually *A. vaupesiana*. The name *A. tessmanii* is actually a synonym of *A. uleanum* Engler. Schultes 12772, 13535, 13621, 13796, 17128.

Arisaema dracontium (L.) Schott, Melet. Bot. i. 17 (1832).

The species ranges from Florida to Texas and north to New England and Canada. The Menomini Indians of northcentral North America used this species in the treatment of "female disorders" (Smith 1923). The Ojibwa Indians used the vapor from boiling roots of this species to treat sore eyes (Moerman 1986).

Arisaema triphyllum (L.) Torrey, Fl. New York **2**: 239 (1843).

The species ranges throughout most of eastern North America. The Meskwaki Indians used the roots to prevent swelling of rattlesnake bites (Smith 1928). Smith (1923, 1932) also reported that roots of this species were used medicinally as a poultice for sore eyes by both the Menomini and Ojibwa Indians of upper midwestern North America. In a similar manner the Chippewa bathed the eyes with boiled root tea while the Iroquois boiled the roots and put their eyes over the steam (Moerman 1986). The cases of the mentioned extracts to reduce "eyesornen: (conjunctival hyperemia) and "swelling of rattlesnake bites" may indicate the vasoconstrictive (blood vessels spasm) effect of the oxytocic substances *or* the similar, but more potent action of structurally-related vasopressin-like compounds (Andrew Kahl pers. comm.). Both the Menomini and Iroquois tribes used the plant to relieve headaches. The Pawnee Indians dried and crumbled roots and sprinkled the powder on the head and temples while the Cherokee Indians held the raw root on the head or temples (Hamel and Chiltoskey 1975; Lewis and Elvin-Lewis 1977 (as *A. atrorubens*); Moerman 1986). The Indians of the Maritime Provinces of Canada use the species to prepare a liniment for external use (van Wart 1948). Such a liniment prepared from boiled roots was used by both the Mohegan and Penobscot Indian tribes for sore muscles and joints (Moerman 1986). The Mohegan Indians also used such a solution internally, gargling a dilute solution made from boiled roots for sore throats (Moerman 1986). The same is true with the Cherokee Indians of North Carolina (Hamel and Chiltolskey 1975). The Malacite Indians of northeastern North America use the species for treating abscesses and boils (Mechling 1959; Chandler et al. 1979). American settlers used the sap or ground raw tubers of the species mixed with lard in the treatment of ringworm (Hare et al. 1908; Angier 1978) and used fresh or partly dried roots for a wide variety of ailments including as a carminative and stimulant for treating flatulence and colic as well as chronic bronchitis (Griffith 1847; Grieve 1981). Dried and powdered root mixed with dough or hogs lard was used as a poultice for swellings or boils (Speck et al. 1942). The dried and powdered tuber was used for treatment of asthma and for phlegm accumulation in the lungs, bronchial tubes and throat (Angier 1978). Grated tubers boiled in milk has been used to relieve coughs and pulmonary consumption (Coon 1963) as well as for tuberculosis (Angier 1978).

Asterostigma luschnathianum Schott, Syn. Aroid. 126 (1856).

The species is endemic to eastern Brazil and known only from Minas Gerais and Rio de Janiero States. It has been valued as a treatment for snakebite (Peckolt 1893).

Caladium bicolor (Ait.) Vent., Jard. Cels. t. 30 (1800).

The species ranges from Panama south to Bolivia, east to Brazil and Guayana. The Achuar Jívaro of Peru use juice scraped from the stem for maggot infestations (Lewis et al. 11138). The Mayna Jívaro use the same for treating (internally) worms in dogs (Lewis et al. 10413). The Maynas also eat boiled stems for treating snakebite (Lewis et al. 10984). In eastern Brazil a form known as "mangara" is employed by using the tuber as an emetic and purgative (Peckolt 1893) while the diluted juice is used as an enema in Ascaridae infestations and is applied to the skin to expel maggots (Peckolt 1892). Infusions of fresh leaves is used for toothaches (Peckolt loc. cit.). The fresh plant may be used as a cathartic and anthelmintic (Griffith 1847).

Caladium schomburgkii Schott, Oester. Bot. Wochenbl. **8**: 122 (1858).

The Mayna Jívaro feed scraped inner rhizomes to puppies to "strengthen" them (Lewis et al. 10718). The species is native to the northern Amazon basin.

Caladium sororium Schott, Oesterr. Bot. Z. **9**: 38 (1859).

The fresh leaves have been used in Brazil as a dressing for cankerous ulcers (Correa 1909; Peckolt 1892; Pereira 1929). The range of the species is uncertain but includes much of the Amazon basin.

Calla palustris L., Sp. Pl. 968 (1753).

The species ranges from Alaska to Newfoundland, south to Minnesota, Indiana and Pennsylvania. The forest Potawatomi Indians of northcentral North America have used pounded rhizome of this North American species as a poultice for swellings (Smith 1932). It is also reportedly a powerful diaphoretic in small doses.

Dieffenbachia sp.

Scraped stems are applied to skin for relief of itching by the Mayna Jívaro of Peru (Lewis et al. 11017).

Dieffenbachia sp.

The Achuar Jívaro of Peru apply sap of this species for relief of the swellings of ant stings (Lewis et al. 12840). With another collection (Lewis et al. 12774) the stem was baked wrapped in a leaf then applied as a poultice to ant stings. In another case (Lewis et al. 12797) the juice was squeezed onto the ant sting from the stem which had been cooked in the same manner.

Dieffenbachia sp.

An unidentified species was reported by Duke (1968) to be included in a remedy for colds by the Cuna Indians in Panama.

Dieffenbachia costata Klotzsch, Syn. Aroid. 128 (1856).

Native to Peru, this species is used in the Peruvian Amazon as a remedy for rheumatism by placing a warmed leaf on the inflamed area (Plowman 1969).

Dieffenbachia picta Schott, Oerst. Bot. Wochenbl. **2**: 68 (1852).

This species has a confused taxonomic history and an unknown range. It is widely cultivated. In Brazil it is used as a remedy for angina (Guedes et al. 1985). The leaves are boiled and the liquid is used as a gargle.

Dieffenbachia seguine (Jacq.) Schott, Melet. Bot. **1**: 20 (1832).

The species is native to the West Indies, Central America and northern South America. It has been used as a contraceptive in parts of the Lesser Antilles as well as in Cuba, Santo Domingo, and Puerto Rico (Dvorjetski 1958). The first reported use of the species was in 1832 as a cure for impotence and frigidity (Bown 1988). Bown (loc. cit.) describes reports of this species being used in sterility experiments with rats by Nazi doctors who hoped to use the material on humans. The species is used in Martinique as an ingredient in an antidote for the bites of pit vipers (Stehle and Stehle 1962). It was reported to be used by the Carib Indians to treat yaws (Hodge and Taylor 1957). West Indian Blacks boil sap of the species with hog's lard and rub the solution onto swollen areas in dropsy states (Lindley and Moore 1897; Saunders 1891). It has been used in the treatment of gout (Barnes and Fox 1955; Fouchtman et al. 1969). Sloane (1707) reported that slices of the root, boiled in wine and then used to soak the feet, were useful in the relief of gout. In Guatemala the smashed leaves are still used as poultices for gout, rheumatism and for the bites of poisonous animals (Aguilar Giron 1966). In El Salvador the oil extracted from the seeds is applied to minor inflammations, burns and small wounds (Guzman 1947). In Brazil a leaf decoction is gargled to relieve angina (Cruz 1956). Schultes and Raffauf (1990) report the species to be used in the production of a curare among the Tikuna Indians in the Trapezco Amazonico in southern Amazonas Department of Colombia (Schultes and Raffauf 1990). This latter report is based on Krukoff 7637 and no doubt represents another species.

Dracontium sp.

The pulp from the scraped tuber is applied to boils by the Achuar Jívaro of Peru (Lewis et al. 11118).

Dracontium asperum K. Koch, Wochenschr. Gartnerei Pflanzenk. **33**: 259 (1859).

The species is native to southern Venezuela, Surinam, and Amazonian Brazil. Roots and petioles of this species are crushed with sugar and alcohol resulting in a tincture which is consumed at short intervals for snakebite (Plowman 1969). The remaining pulp is placed on the snakebite area. The dried and powdered tuber of the species is also used for asthma, chlorosis, amenorrhea and whooping cough (Le Cointe 1934; Peckolt 1892). Juice from the rhizomes are used to kill maggots in animals (Plowman 1969).

Dracontium dubium Kunth, Ind. Sem. Hort. Berol. 21 (1844?).

The species is said to be endemic to the Guianas. This species is used as an antidote for venoms of snakes, spiders and sting rays (Lévi-Strauss 1952).

Dracontium loretense K. Krause, Notizbl. Bot. Gard. Berlin-Dahlem **11**: 617 (1932).

The species ranges from Colombia to Peru along the eastern margin of the Amazon basin. The Jívaro Indians of Peru use this species extensively as a snakebite remedy. The Mayna Jívaro rub the base of the tuber or the pulp from split petioles on the wound (Lewis et al. 10634). The Achuar Jívaro use scraped base of the tuber and cold inflorescences to massage snakebite for relief (Lewis et al. 10219). The Achuar also use the crushed tuber of this species mixed with equal parts of two other species (*Solanum* "untukar") and "syukahuito") for application to quicken the maturation of boils and make tumors recede. Tubers are also cooked and eaten to relieve chest pain (Lewis et al. 11956). This species was reported by Plowman (1969) as *D. trianae* Engler based on Pinkley 60, 60a, 294; Martin, Plowman & Lau-Cam 1661. Like the report for *D. longipes*, the tuber of the species was ground and used as a paste to be applied to snakebites. Metraux and Metraux (1948) reported (as *D. longipes* Engler) that leaves of a species determined as this species are rubbed on snakebite wounds by the Amahuaca Indians of Ecuadorian Montaña. Schultes and Raffauf (1990) report (as *D. longipes* Engler) that the same species is cultivated by the Kofán Indians of Colombia and Ecuador and use the plant to prepare a decoction for diarrhea. They further report that in Peru the tuber is ground into a paste, wrapped in *Calathea* leaves and warmed in a fire and then used as a plaster on snakebites. Torres & Tina 2054.

Dracontium pittieri Engler, Bot. Jahrb. Syst. **37**: 122 (1905).

The species is endemic to Costa Rica. An infusion of the leaves is used on wounds of animals to kill maggots (Pittier 1957). Pittier also reports that leaf infusions of the plant taken internally and applied externally are used as a remedy for the poisonous bite of the bocaraca snake. The preferred application by the Bribri Indians of Costa Rica is to first boil an infusion of leaves then apply the cooled solution to the snake bite wounds (Ginzbarg 1977).

Dracontium polyphyllium L., Sp. Pl. **1**: 967 (1763).

A native to the Guianas and Amazonian Brazil, this species is used as a snakebite remedy (Plowman 1969) and as a remedy for hemorrhoids.

Dracontium trianae Engler, Pflanzenr. IV. **23C** (Heft 48): 44 (1911).

This species is apparently endemic to Colombia. The Kofán Indians of southern Colombia and northeastern Ecuador drink a decoction from the tuber of this species to cure diarrhea (Schultes and Raffauf 1990).

Heteropsis sp.

An unidentified species is reported to have medicinal properties in the bark (von Reis 1962).

Heteropsis oblongifolia Kunth, Enum. Pl. **3**: 60 (1841).

The Mayna Jívaro of Peru scrape stems of this species, heat them to near boiling and then apply immediately to the stings of ants. The species is native to the Amazon basin and eastern Brazil. Lewis et al. 10504.

Homalomena sp.

The Huambisa Indians of Peru bake the rhizome and stem base of this species then use it as a moist poultice for scorpion stings (Lewis et al. 13066).

Lysichiton americanum Hulten et H. St. John, Svensk. Bot. Tidskr. **25**(4): 455–457 (1931).

This northwestern North American species has been used in western Washington State as a remedy for ringworm and scrofula (skin eruptions associated with certain forms of tuberculosis) (Gunther 1945). Raw tuber of the species is used by the Makah Indians of Washington State to induce abortion, while cooked tuber is used by the Quileute Indians to ease labor during childbirth (Gunther 1945). Bown (1988) suggests that the active ingredients are partially in-activated by cooking so that the final products merely strengthen normal contractions while the initial components are so strong as to create violent contractions that cause abortion.

Monstera sp. (section Marcgraviopsis)

The Achuar Jívaro apply heated leaves to the skin over the liver to relieve pain (Lewis et al. 11216).

Monstera adansonii Schott, Wiener Z. Kunst **4**: 1028 (1830).

This widespread species, ranging from Nicaragua to the Guianas, Brazil, and Peru, was reported as *M. pertusa* (L.) de Vriese by Plowman (1969). It has a wide variety of medicinal uses including those for neutralizing snakebites (Peckolt 1892; Pereira 1929), for cauterizing wounds (Pereira loc. cit.), as a vesicant (Perez-Arbelaez 1956), and as compresses for healing wounds and eczema with abscesses (Peckolt 1892). Crushed and boiled leaves are used by the Siona Indians of northeastern Ecuador on boils (Schultes and Raffauf 1990). Vicker 251.

Monstera deliciosa Liebm., Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn **19**: 9 (1849).

The species ranges from Mexico to Panama. In Mexico a decoction of the plant is used as a remedy for arthritis (Martinez 1928).

Monstera spruceana (Schott) Engler, Fl. Bras. **3**(2): 115 (1878).

Peruvian mestizos mix the species in water and drink periodically for treatment of an ailment of the pancreas (Lewis et al. 12283). The Achuar Jívaro heat leaves of the species and place them over aching livers to relieve pain (Lewis et al. 11979).

Montrichardia arborescens (L.) Schott, Arac. Betreff. **1**: 4 (1854).

Many of the reports of medicinal uses of this species in Plowman's 1969 paper are unreliable because of the confusion of this species with *M. linifera*. *Montrichardia arborescens* ranges from Guatemala to northern Brazil, whereas *M. linifera* occurs in southern Venezuela, northern Brazil and Colombia.

There are reports of *Montrichardia* being used medicinally in both Paraguay (Parodi 1886) and Argentina (Storni 1937) but the genus occurs in neither country. Reports of the use of the sap of this species in a poultice for ulcers (Le Cointe 1934) or of its crushed leaves mixed with manioc flower as a poultice for torpid abscesses or in a decoction used in compresses for gout (Plowman 1969) probably refer to *M. linifera* rather than *M. arborescens.*

Montrichardia linifera (Arruda) Schott, Arac. Betreff. **1**: 5 (1854).

This species was reported as *M. arborescens* Schott by Schultes and Raffauf (1990). They report that its dried, powdered roots act as a potent diuretic in the Amazon region. The leaves are considered anti-rheumatic and also effective in curing ulcers (Plowman 1969).

Philodendron sp.

The Achuar Jívaro of Peru use a poultice of this species for snakebite (Lewis et al. 10829).

Philodendron sp.

The Achuar Jívaro of Peru use the pith of the baked stem of this species in a poultice to treat ant stings (Lewis et al. 12885).

Philodendron sp.

The Achuar Jívaro apply a leaf poultice of this species for snakebites (Lewis et al. 12856).

Philodendron sp.

The juice of this species is used by the Tikuna Indians from the Trapezco Amazonica of Amazonas Department in southern Colombia to relieve itch or heal mangy areas of the skin (Schultes and Raffauf 1990). Glenbosky 256.

Philodendron sp.

Sap from the inflorescence of this species is applied to persistently infected wounds by the Witoto Indians in the Trapezco Amazonica of Amazonas Department in southern Colombia (Schultes and Raffauf 1990). Schultes 26081.

Philodendron sp.

Crushed stems and leaves of this species are used along with the bark of three tree species, *Strychnos* sp., *Vochysia ferruginea* and *Ormosia macrophylla* to prepare a curare for hunting (Schultes and Raffauf 1990). [no voucher cited]

Philodendron bipinnatifidum Schott, Melet. Bot. 20 (1832).

The species occurs in southern Brazil, Paraguay, and Argentina. It was reported as *P. selloum* K. Koch by Plowman (1969). The juice of the species is used as a remedy for orchitis, rheumatism and ulcers (Correa 1931) and the seeds are reported to be anthelmintic (Peckolt 1892). In Brazil the seeds and roots of the species are used as a vermifuge (Correa 1931; Uphof 1959).

Philodendron campii Croat.

Known by its Quichwa name 'Avispa-paju' (mal de la avispa) or 'Ninguno', this species, currently new to science, is used by the Quichua Indians of the Yasuní region for tumors of the skin. The ground plant tissue is applied locally to the tumor (Alarcón 1988). The species is native to Amazonian Ecuador and Peru.

Philodendron cordatum Kunth, Enum. Pl. **3**: 52 (1841).

In Brazil the leaf juice of the species is mixed with soap for treating eczema and other skin problems (Lewis and Elvin-Lewis 1977). It is native to eastern Brazil.

Philodendron craspedodromum R. E. Schultes, Rhodora **66**: 118 (1964).

The species occurs in Colombia and southern Venezuela. It is used as a fish poison by the Desano Indians along the Río Papurí in SE Colombia. Leaves and petioles are allowed to rot before being crushed then cast into the water (Schultes 1964; Schultes and Raffauf 1992). Schultes & Cabrera 15347.

Philodendron cuneatum Engler., Bot. Jahrb. **6**: 281 (1885).

Schultes and Raffauf (1990) report that the Taiwano Indians of the Río Kananarí of eastern Colombia use leaves of this species mixed with animal fat for curing skin diseases. The species is native to the upper Amazon basin. Schultes & Cabrera 14761.

Philodendron dyscarpium R. E. Schultes, Lloydia **26**: 69 (1963).

The species occurs in southern Venezuela and southern Colombia. Several tribes of Vaupés Department of Colombia, including the Kubeos and Tanimukas, consider powdered inflorescences of this species their best female oral contraceptive (Schultes 1963; Schultes and Raffauf 1992).

Philodendron fragrantissimum (Hook.) G. Don in Sweet, Hort. Brit. ed. **3**: 632 (1839).

The species ranges from Belize to Panama, Cuba, Trinidad, the Guianas, northern Brazil, southern Colombia, and western Peru. A cold poultice of plant parts is applied to the skin over aching livers to relieve pain (Lewis et al. 12442) but in another version of the treatment the same species is used after heating the leaves (Lewis et al. 11780). It is used by the natives of the Río Apaporis in southern Colombia for skin infections and boils. The fresh inflorescences are mixed with animal fat and applied to the skin (Schultes and Raffauf 1990). Schultes & Cabrera 15214.

Philodendron hylenae Bunting, Acta. Bot. Venez. **10**: 298 (1975).

The species ranges from southern Venezuela to Guyana, Brazil (Amapá, Roraima, Amazonas), Colombia, Ecuador, and Peru. The crushed leaves and petioles of this species are mixed with "farina", a flour made of Manihot, and are used as a vermifuge (Schultes and Raffauf 1990). Schultes & Cabrera 15776.

Philodendron imbe Schott ex Endlicher, Enum. Pl. **3**: 50 (1841).

A decoction of the leaves of this southeastern Brasilian species (Pernambuco to Rio Grande do Sul) is used in a bath or a poultice made from fresh leaves as a remedy for acute and chronic orchitis (Plowman 1969). Similar dressings may be used for rheumatic joints, ulcers or edemas (Matta 1913). The species is native to eastern Brazil.

Philodendron insigne Schott, Syn. Aroid. 73 (1856).

This species is native to the northern Amazon basin in Colombia, Brazil, Ecuador and Peru. Schultes (1964; Schultes and Raffauf 1990) reports that the red coloring of the spathe is used ritually in medicinal affairs by the Kubeo Indians. Though the significance is not known, the medicine men consider that it has magical properties and cover their hands with the red sap before dealing with patients. Schultes reported the species as *P. haematinum* R. E. Schultes, now considered a synonym of *P. insigne*. Schultes 22678, 16067, 17804.

Philodendron krebsii Schott, Bonplandii **7**: 164 (1859).

The species is endemic to the West Indies. In Cuba a decoction of stems, roots and leaves is used to expel intestinal worms (Roig and Mesa 1945). The species is also used in Cuba as an abortion inducing agent (Plowman 1969). Sap in the aerial parts of the stems are used for contusions and as a strong cauterizing agent (Plowman loc. cit.).

Philodendron lacerum (Jacq.) Schott, Wiener Z. Kunst **3**: 780 (1829).

This species was reported by Plowman (1969) based on a paper by Roys (1931) which attributed to *P. lacerum* important medicinal properties for the 16th Century Mayan populations. It is curious, because this species is known only from the larger West Indian Islands. Quite possibly it was really *P. radiatum*, another species with more deeply lobed leaf blades, that was used by the Mayans.

Philodendron megalophyllum Schott, Prodr. Syst. Aroid. 279 (1860).

The species ranges from the Guianas, southern Venezuela to northern Brazil and the western Amazon basin in Ecuador, Peru, and Bolivia. Known as "co-me" by the Waorani, this species is used for treating snakebite (Schultes and Raffauf 1990). Davis & Yost 1023.

Philodendron pedatum (Hook.) Kunth, Enum. Pl. **3**: 49 (1841).

The species ranges from Venezuela and the Guianas to Brazil (Amapá, and Pará to Ceará). It also has been collected in the Chocó of Colombia. In Brazil fresh leaves spread with oil are used as a dressing for gout pains (Peckolt 1892). This species was reported as *P. lacinatum* Engler [*P. lacinatum* (Vell.) Engler] by Plowman (1969).

Philodendron radiatum Schott, Oesterr. Bot. Wochenbl. **3**: 378 (1853).

The species ranges from Mexico to Colombia (Antioquia). In Central America a decoction of leaves is used as a remedy for gout and rheumatic pains (Standley and Calderon without date; Uphof 1959).

Philodendron remifolium R. E. Schultes, Rhodora **66**: 120 (1964).

Chopped up leaves of this species, native to SE Colombia and SE Venezuela, are used by the Tukano Indians along the Río Papurí in southern Colombia in the Trapezco Amazonica in Amazonas Department to give fermented fruit drinks an acidic flavor (Schultes and Raffauf 1990). Schultes & Cabrera 19553.

Philodendron rigidifolium K. Krause, in Engl., Pflanzenr. **60** (IV.23Db): 7 (1913).

The species ranges from Nicaragua to Panama. Known as 'chincadora' in Darién Province of Panama, the leaves of the species are applied as a poultice for snake bites (Duke 1968). No voucher has been located.

Philodendron sagittifolium Liebm., Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 17 (1849).

This species ranges from Mexico to Colombia and Venezuela. The acrid sap is reportedly used for wart removal (Plowman 1969).

Philodendron speciosum Schott ex Endlicher, Gen. Pl. **1**(3): 237 (1837).

The species is endemic to the region near Rio de Janiero. Juice from stems and leaves is used for gout and as a resolvent for furuncles, tumors and abscesses (Plowman 1969). The crushed seeds and anthelmintic (Peckolt 1892; Correa 1931).

Philodendron tripartitum (Jacq.) Schott, Wiener Z. Kunst **3**: 780 (1829).

The leaves of this species mixed with beer are said to cure snakebite (Perez-Arbelaez 1956). The species ranges from Mexico to Colombia and Ecuador on the Pacific slope.

Philodendron warszewiczii K. Koch et Bouché, Ind. Sem. Hort. Berol. App. 4 (1855).

The species ranges from southwestern Mexico to Honduras. Its leaves are decocted in water for rheumatism (Standley and Calderon without date).

Pistia stratiotes L., Sp. Pl. 963 (1753).

The species has a pantropic distribution. In Cuba a decoction of the plant is drunk to act as a demulcent to relieve dyspepsia (Roig and Mesa 1945). The leaves are mixed with rice and coconut milk and consumed to cure dysentery. A similar mixture of leaves, rose water and sugar is used for coughs or asthma (Roig and Mesa loc. cit.). In the West Indies, a mixture of dried powdered leaves and honey were formerly consumed 2 or 3 times for the treatment of venereal disease (Morton 1981). Crushed leaves mixed with salt are used by the Tikuna Indians of southern Colombia for the removal of warts (Schultes and Raffauf, 1990). In Brazil the crushed leaves serve as a poultice for abscesses, ulcers and hemorrhoids (Peckolt 1893) and leaf decoctions are consumed as an antidiabetic or to prevent blood expectorants of the respiratory system (Morton 1981). Glenbosky 276.

Rhodospatha sp.

The Mayna Jívaro of Peru apply the lower part of cut stems to large ant bites (Lewis et al. 10756).

Rhodospatha latifolia Poeppig, in Poeppig et Endl. Nov. Gen. Sp. **3**: 91. t. 300 (1945).

The species ranges from Colombia and Venezuela to Brazil, Peru and Bolivia. Among the Achuar Jívaro of Peru the scraped and baked spadix is applied for the relief of ant stings (Lewis et al. 12877).

Rhodospatha oblongata Poeppig, Nov. Gen. Sp. **3**: 91 (1845).

The species ranges from Colombia (both sides of the Andes) to the Guianas, Brazil and Peru. The Mayna Jívaro apply the pulp from the scraped spadix interior to the skin of dogs with tapeworm.

Spathiphyllum sp.

This species is used by the Cabecar Indians of Costa Rica to eliminate discolorations of the skin, especially the face, by rubbing the spathe over the skin. No specimen was cited.

Spathiphyllum canniaefolium (Dryand) Schott, Syn. Aroid. **1**: 1 (1853).

The species ranges from Trinidad and the Guianas to Venezuela, Brazil, Colombia, Ecuador, and Peru. The leached ashes of the burned leaves, roots and inflorescences of this species are used to coat pellets of a hallucinogenic paste by the Witoto Indians of the Río Karaparaná of southern Colombia near the Ecuadorian border (Schultes and Raffauf 1990). Schultes 26075.

Spathiphyllum cochlearispathum (Liebm.) Engler, Monogr. Phan. **2**: 221 (1879).

The leaves of this Mexico endemic are used in a poultice to reduce the size of warts and edemas (Schultes 1941).

Spathiphyllum floribundum N. E. Britton, Gard. Chron. **2**: 783 (1878).

Fresh inflorescences of this species are rubbed on foreheads to relieve headaches by the Tukano and Gwanano Indians (near the Río Papurí in southeastern Colombia). The determination is doubtful since Bunting's 1960 revision cites material only from the central Magdalena River Valley. Schultes & Cabrera 19323, 19340, 19523.

Stenospermation sp.

Known as "Mandi" in quichua (snake herb), this species is used against 'granos infectados' by the Quichua Indians of the Jatuncocha region. The affected area is washed with a cooked solution of the plant. Alarcón & Balslev 3057.

Symplocarpus foetidus (L.) Nutt., Gen. N. Amer. Pl. **1**: 106 (1818).

The species is native to east-central North America. Although large doses of powdered root may cause nausea, vomiting, vertigo, disturbed vision and headaches (Lewis and Elvin-Lewis 1977), smaller doses have allegedly been successful against chronic rheumatism, chorea, hysteria, and dropsy. Dosages of 30–40 grams of dried root were taken in repeated doses as a palliative against the paroxysms of asthma. Mixed with equal parts of the roots of *Convolvulus jalapa* L. and prepared into a syrup, the species is used effectively for consumption, cough, hay fever, pleurisy, pulmonary consumption, catarrh (Lewis and Elvin-Lewis 1977) and asthma (Hutchens 1974). Preparations of seeds are said to be more effective against asthma than those of roots. All parts of the plant are reportedly antispasmodic. It has apparently been employed for epilepsy, eclampsia and for abdominal spasms following child birth. Hutchens (1974) reports that the antispasmodic solution is prepared by mixing *Symplocarpus* with *Viburnum, Scutellaria, Eugenia* and *Capsicum* in sherry wine. Used externally it has been used as an ointment which stimulates granulations and eases pain (Grieve 1981). Bruised leaves have been applied externally to ulcers. The juice of the leaves have been used to treat various types of herpes infections and blisters. It has been considered a stimulant, an emetic, and a narcotic (Coon 1963) depending on the way the medication is prepared (Andrew Kahl pers. comm.). The species was used by early American Indian tribes. The Meskwaki Indians used the leaf bases as a poultice to reduce swelling (Smith 1928). The root hairs of the species were used to stop hemorrhage and to relieve toothaches by the Meskwaki Indians (Smith 1928). The Micmac Indians crushed leaves of the species and inhaled the pungent oils as a remedy for headaches (Lewis and Elvin-Lewis 1977).

Syngonium podophyllum Schott, Bot. Zeit. (Berlin) 85 (1851).

The species ranges from Mexico to the Guianas, Brazil, and Bolivia. It was reported as *S. vellozianum* by Plowman (1969). The juice of the crushed leaves of this species is purportedly a cure for asthma (Peckolt 1892). The sap of this species is applied to stings of the Paraponera ant by the Siona Indians of northeastern Ecuador (Schultes and Raffauf 1990). Vickers 35, 96, 112.

Syngonium yurimaguense Engler, Bot. Jahrb. Syst. **37**: 141 (1905).

The species is known only from the Amazon basin in Brazil, Colombia, Ecuador, Peru, and Bolivia. Among the Mayna Jívaro the stem sap, soaked into cloth tied to broken bones is used to aid in mending (Lewis et al. 12450). The stem sap is used to treat the sting of the conga ant by the Tikuna Indians of far southern Colombia (Schultes and Raffauf 1990). Glenbosky 30.

Urospatha antisylleptica R. E. Schultes, Bot. Mus. Leafl., Harvard Univ. **18**: 311 (1959).

The species is poorly known and presumably endemic to Colombia. The powdered immature spadix of this species is fed to women of the Barasana tribe on the Río Piraparaná of southern Colombia (Schultes 1963) for contraceptive purposes. The species is probably inseparable from *U. sagittifolia* (Rodsch) Schott. Schultes & Cabrera 17425.

Urospatha loefgreniana Engler, Bot. Jahrb. Syst. **37**: 121 (1905).

This species is known only from southeast Brazil in the state of Sâo Paulo. Schultes and Raffauf (1990) report that the Witoto Indians once used the root of this species in a form of curare. The collection upon which this observation was made, i.e. Schultes 22570, appears to be a mixed collection. The leaf appears to be *Montrichardia arborescens* (L.) Schott, while the inflorescence is that of *U. sagittifolia*.

Urospatha sagittifolia (Rodsch) Schott, Aroideae. (1853).

The species ranges from Venezuela and the Guianas to Brazil, southern Colombia, Ecuador and Peru. The pulp of the scraped rhizomes is applied to snake bites by the Mayna Jívaro of Peru. In Brazil the sap of its fresh roots is used as a cauterizing agent and as a poultic for dry herpes (Peckolt 1892). This species was reported in the above references as *U. caudata* (Poeppig) Schott, now considered a synonym of *U. sagittifolia*. Schultes and Raffauf (1990), using the name *U. somnolenta* R. E. Schultes, reported that the ashes of the plant are used as a poultice on ulcers and infected cuts by the Kubeo tribe of the Río Kuduyarí in southeastern Colombia. Schultes 22589; Schultes & Cabrera 15402.

Xanthosoma sp.

An unknown species of this genus is used to treat snakebites by the Ketchwa Indians of Napo Province in Ecuador (Iglesias 1985).

Xanthosoma atrovirens K. Koch et Bouché, Ind. Sem. Hort. Berol. App. 3 (1854).

The taxonomy of this group is in serious doubt so the identification of the reports (Plowman 1969) are doubtful. The species has been reported to relieve swelling of the spleen and liver following attacks of swamp fever with the application of fresh leaves on the body (Peckolt 1893; Uphof 1959).

Xanthosoma auriculatum Regel, Ind. Sem. (St. Petersburg) 81 (1868).

This is a Brazilian species whose taxonomy is much in doubt. The sap of what was believed to be this species is considered to be effective in treating very severe wounds and skin diseases (Peckolt 1893).

Xanthosoma helleborifolium (Jacq.) Schott, Oesterr. Bot. Z. **15**: 33 (1865).

The species ranges from El Salvador to the Guianas and Amazonian Peru as well as in the Antilles. In conjunction with other herbs the leaves of this species are believed to be effective against snakebite (von Reis 1962). The plant is heated by the Huambisa Indians of Peru and a moistened poultice is used to massage snake bite (Lewis et al. 13068). The Quichua

Indians of Amazonian Ecuador boil the ground tuber of the species in water and consume the liquid for treatment of snakebite (Alarcón 1988). Alarcón & Balslev 2973.

Xanthosoma pentaphyllum (Vell.) Schott, Oesterr. Bot. Z. **15**: 33 (1865).

The species is endemic to south-central and southern Brazil. When consumed, the petioles of this species are considered effective in the treatment of gonorrhea. When applied externally they are purportedly effective against orchitis (Correa 1931).

Xanthosoma robustum Schott, Oesterr. Bot. Wochenbl. **3**: 370 (1853).

The species is widespread at higher elevations in Central America. Steam from cut and heated pieces of the tuber is inhaled as a cure for asthma, colds, and coughs. Boiled leaves are fed to nursing mothers to stimulate milk production (Schultes 1941).

Xanthosoma violaceum Schott, in Osterr. Bot. Wochenbl. **3**: 370 (1853).

A widespread South American species that is often cultivated and escaped. The Mayna Jívaro of Peru use the leaves to apply directly to body parts with pain, especially the legs and also to treat rheumatic pain (Lewis et al. 10898). They also apply the juice from the split peduncles to itchy skin (Lewis et al. 10930). The same tribe also applies juice from the split fruits to the skin of dogs to treat tapeworms (Lewis et al. 11025).

Zantedeschia aethiopica (L.) Spreng., Syst. Veg. **3**: 765 (1826).

The species is a native to southern Africa but it has widely escaped in open montane areas of Central and South America. The natives of San Pedro Yolox in Chiapas State of Mexico use the leaves of the species for treating burns.

Discussion

Perhaps the largest category of healing with aroids is external with plant parts or extractions and decoctions of plant parts being used as poultices and applied directly to the surface of the affected area to cauterize, disinfect or stop bleeding and decrease swelling. Tannins are particularly useful in the healing process as they are astringent and precipitate protein to seal wounds (Bown 1988). Many aroids have raphides of calcium oxalate and other irritating substances. They are thus particularly suited as rubefacients which cause temporary controlled inflammation and in turn stimulates blood circulation and lymph flow which therefore speeds the excretion of toxins (such as uric acid in the case of gout) (Bown 1988). Arditti and Rodriguez (1982) argues convincingly that calcium oxalate crystals may not be the direct cause of the irritation caused by *Dieffenbachia* but rather that a proteolytic enzyme called "dumbcain" (Walter 1967; Walter and Khanna 1972) may be the causative factor. Other possible factors include the release of kinins as a result of the injury caused by oxalate crystals or protease activity (Walter and Khanna loc. cit.) and sapotoxins and unidentified glycosides have also been implicated in the toxicity of *Dieffenbachia* (Arditti and Rodriguez loc. cit.).

The majority of the species of Araceae listed above (58 species), have been used for external healing for a wide variety of maladies including: ringworm, scrofula (skin eruptions associated with tuberculosis), fever or canker sores, boils, wounds, contusions, abscesses, abscessing eczema, ulcers, gout, itch, mange, ear infections, headaches, edema, rheumatism, yaws, hemorrhoids and orchitis. Other uses include: killing botfly larvae, making them easier to remove, expelling maggots from wounds, containing or removing warts, relieving stiff neck muscles, cauterizing wounds, resolving furuncles, tumors or abscesses, stimulating granulations and relieving pain and as an antidote for the bites of snakes or ants or the wounds of sting ray.

Despite the caustic nature of many aroids, many species have been used internally by ingesting small amounts of ground plant parts or juice. Most aroids that have been used for internal medicine have made use of properties that make them useful as expectorants, vermifuges, sedatives, or as putative contraceptive, hallucinogenic or anticancer substances (Bown 1988). In all, a total of 33 species of Araceae were consumed at least in part for putative cures for medical problems or as birth control techniques. Examples of medical problems for which the internal consumption of aroid materials were used include the following: snakebites, headaches, toothaches, gum infections, chlorosis, amenorrhea, asthma, coughs, whooping cough, chronic bronchitis, pulmonary consumption, tuberculosis, arthritis, flatulence, colic, sore throats, rheumatism, chorea, hysteria, edema, ulcers, diarrhea, orchitis, gonorrhea, epilepsy and yaws. Internal consumption of aroids has also been involved in: the production of hallucinogenic experiences, as an emetic or purgative, vermifuge, diuretic, diaphoretic, contraceptive, inducing abortions, the prevention of tooth decay, the prevention of convulsions during pregnancy, the stimulation of milk production in nursing mothers, and the control of excess phlegm in the lungs, bronchial tubes and throat. Obviously their use in the production of poisonous curares involves internal use but for the purpose of killing rather than healing.

Some species of Araceae were used both externally and internally to remedy the same problem. Examples are *Anthurium scandens* and *Dracontium asperum* which are used both internally and externally as remedies for snakebites.

More frequently, when an aroid is used for both internal and external medicine the maladies are different. Extracts of *Caladium bicolor* are used internally as an emetic or purgative to expel internal parasites and externally to rid wounds of maggots. *Dracontium asperum* is used internally for asthma, chlorosis, amenorrhea and whooping cough and externally also to kill maggots in wounds. *Dracontium trianae* is used internally for diarrhea and externally for treatment of snakebites. *Philodendron krebsii* is used internally for expelling worms and for inducing abortions and externally for healing contusions and as a cauterizing agent. *Symplocarpus foetidus* is used internally in small doses for asthma, chronic rheumatism, chorea, hysteria, epilepsy, edema, and convulsions during pregnancy. Externally it is used as a salve to stimulate granulations and ease pain. *Arisaema triphyllum* is used internally to treat flatulence, colic, chronic bronchitis, asthma, sore throats, coughs, pulmonary consumption and tuberculosis. It is used externally to treat ringworm and to prevent swelling in rattlesnake bites. *Dieffenbachia seguine* is used internally as a contraceptive and externally to treat yaws and edema. *Dracontium trianae* is used internally to treat diarrhea and externally for snakebites. In some cases, different parts of the same plant serve different purposes medicinally. A decoction of boiled roots of *Anthurium uleanum* is used for headache remedy and a similar solution made from all part of the species is used for relieving sore neck muscles. In the case of *Philodendron speciosum* juice from the stems and leaves is used as a remedy for gout and to resolve furuncles, tumors and abscesses while the seeds are anthelmintic, used to rid the body of internal parasites.

Most of the species of Araceae which are used internally for bronchial problems contain saponins, soap-like glycosides which increase the permeability of membranes to assist in the absorption of minerals but also irritate the mucous membranes and make it more effective to cough up phlegm and other unwanted substances in the lungs and bronchial passages (Bown 1988).

Perhaps not surprisingly those species with the greatest number of ascribed uses are either temperate species like *Arisaema triphyllum* and *Symplocarpus foetidus*, which have a long history of association with modern herbalists, or tropical plants, like

Dieffenbachia seguine, which have been in cultivation for a very long time. Perhaps as much as anything else there are many fewer species of plants in temperate areas to try as medicinal plants. The converse is true in tropical areas where there are many species of plants with which to experiment and a mostly unrecorded history of medicinal plant use.

It is surprising that so many aroid species are consumed internally because extracts of the Araceae tend to be very caustic or even poisonous. Many aroids contain oxalic acid and crystals of calcium oxalate. Calcium oxalate crystals may occur as needle-like raphides in special cells and may cause considerable mechanical damage when eaten. While calcium oxalate crystals are found in most plant families, they play a much larger role as protection against animal predation in the Araceae than in most other families. Raphide cells are especially common in the genus *Dieffenbachia* and in the subfamily Monsteroideae where they are particularly abundant in the lining of the walls around the developing ovary, a further indication of their role in the prevention of herbivory. In *Dieffenbachia* the raphide cells occur in special cells called idioblasts which burst when broken to discharge numerous, needle-like raphide cells with considerable force.

Conclusion

Aroids have a long history of use as medicinal plants despite their relatively unimportant modern day usage. While most have never been clinically tested for efficacy their persistent use historically by widely differing populations as remedies for similar diseases is a strong indication that many do have useful medicinal properties.

This paper was read in the 7th International Symposium on Chinese Drugs held in 1993 in Beijing, China.

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クロート T. B.：薬用植物として利用される新世界産サトイモ科植物

新世界，特に中南米からは多数の薬用植物が知られている．しかし，それらを総合的に展望できるような文献はほとんどない．本論文は新世界のサトイモ科の薬用植物について，従来発表されている **Plowman (1969), Morton (1981),** および**Schultes and Raffaut (1990)** に加えて，**Lewis** 夫妻がアマゾン上流域のインディアンの利用状況を調査した未発表のデータをもとにまとめた総説である．各植物がどこでどのように使われているかという情報が植物名のアルファベット順に配列されている．有用植物・薬用植物を取り扱うにあたって常に問題となるのはそれらの基源植物の同定が正しいかどうかということである．本論文の著者は新世界のサトイモ科の分類の専門家であり，**ECON** に所蔵される **Schultes and Raffaut (1990)** の証拠標本および **MO** と **USM** に所蔵される **Lewis** 夫妻の証拠標本の同定を再検討している．それら引用標本の採集者と標本番号はリスト中に示されており，今後のこの分野の研究に際し，実物と比較しつつ進めていく上で便利である．